

Negative and Zero Exponents

Date: _____

Recall Exponent Laws:

Multiplication: $3^4 \times 3^2 =$

Division: $2^5 \div 2^3 =$

Powers: $(4^2)^3 =$

Negative Exponents

Using the division law: $\frac{3^2}{3^6} =$

or $\frac{3^2}{3^6} =$

Result: A base raised to a negative exponent is the reciprocal of the base raised to the positive of the exponent.

EX: **A.** 4^{-2} **B.** $(-5)^{-4}$ **C.** $\left(\frac{2}{3}\right)^{-3}$

Zero Exponents

Using the division law: $\frac{5^3}{5^3} =$

or $\frac{5^3}{5^3} =$

Result: Any base raised to the exponent 0, the result is 1.

EX: A. 4^0 B. $(-7)^0$ C. -7^0

D. $\left(\frac{1}{3}\right)^0$

Application - "Half Life"

$$A = A_o \left(\frac{1}{2}\right)^{\frac{t}{h}} \quad \text{Time}$$

Original amount of
the radioactive element

The amount of time it takes for the
substance to decay to half of the original amount

EX: Cobalt-60 is a radioactive element that is used to sterilize medical equipment. Cobalt-60 decays to half ($\frac{1}{2}$ or 2^{-1}) of its original amount every 5.2 years. Determine the remaining mass of 20g of cobalt-60 after 20.8 years.